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AUTHOR Ramsden, Paul; And Others
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ABSTRACT

This study investigated school effectiveness based on recent British and Australian advances in the understanding of student learning processes in natural settings via students' approaches to learning and their perceptions of teaching. The results were derived from a survey of 745 government school students, 380 Catholic school students, and 365 independent school students in 50 Melbourne, Australia schools. The survey had response rate of 90 percent. Correlations were drawn from scores based on instruments that tested students' "surface approach" to learning, which involves unreflective rote memorization, and "deep approach" to learning, which involves interpreting relationships between parts of subject matter; also scored were students' perceptions of teaching effectiveness. ANOVA was used to measure the association between student perceptions of their "surface" or "deep" learning strategies and their formal achievement as evaluated by standardized end-of-year subject examination results. Findings demonstrated that students who reported "deep" strategies to learning perceived the teaching in the schools they attended to be better than those students who reported "surface" strategies. Although "surface" students scored lower on the end-of-year examination than the "deep" students, the low correlation between the deep approach and formal achievement did not suggest which school learning environment was more desirable or which learning strategies augmented achievement. (JAM)

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STUDENTS' LEARNING AND PERCEPTIONS OF TEACHING: SCHOOL EFFECTIVENESS RECONSIDERED

Paul Ramsden, John A. Bowden and Elaine Martin

University of Melbourne

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INTRODUCTION

Hardly a day passes by without a reference in the presses of western nations to the relative educational merits of state and private schools. The 'single incontestable fact' (Williams, 1987, p.79) in this debate in Australia is that, on the average, students who attend private schools do better in most respects. More of them complete their secondary education, more of them obtain high grades in school-leaving examinations, more of them gain places in higher education, and more of them enter professional occupations.

Similar advantages apparently accrue to students in fee-paying schools in other countries. Does this mean that private schools are more effective than comprehensive schools? Should parents choose to spend money on private schooling? These controversial questions have given birth to an enormously complex literature in the sociology of education (see Cuttance, 1986, for a comprehensive review). However, there are two fundamental issues in understanding school effectiveness that have not been fully appreciated: the validity of outcome criteria and the need to consider performance at different levels of analysis.

The first of these issues is important from the point of view of both educational policy and educational psychology. What counts as a valid criterion of effectiveness? Most studies of secondary school effectiveness have concentrated entirely on student performance in standardized tests of attainment or public examinations. Such an emphasis is understandable, given the value of these results in the education and employment market place. But examination results may not accurately reflect achievement. There is a growing body of evidence to suggest that school leaving examinations can often be successfully negotiated through the use of minimalist, reproductive approaches to studying. The use of these approaches perhaps explains why so many students, even in higher education, have been shown to possess fundamental misconceptions of physical and social phenomena. The results of tests and public examinations do not invariably tell us whether children have learned what was intended. It may be wise to consider additional criteria when assessing how effective a school is.

The second issue hinges on the contribution of individual schools to school sector performance. If there is diversity <u>within</u> different sectors, then it may be meaningless, both educationally and statistically, to speak of a particular school being better than another simply because it belongs to a certain sector (see Willms, 1984; Aitken and Longford, 1986). In this situation, school (and student) level analyses are required as well.

The aim of this paper is to present a distinctive view of school effectiveness based on recent British and Australian advances in our understanding of student learning processes in natural settings. The results derive from a survey of students in the final year of secondary education in 50 Melbourne schools. Our perspective fixes attention on the quality of students' engagement with learning tasks -- their <u>approach</u> to learning -- and on the relation between the approach used and the teaching <u>context</u> in which the students learn. Which schools have the best teaching and curriculum? In which schools do children learn most effectively? Do students' perceptions of teaching influence the quality of their learning? What is the association between examination performance and approaches to learning at this level?

Recent research on learning in educational settings

Over the past decade educational researchers have developed new insights into learning processes. The pioneering work of Marton in Sweden, Entwistle in Britain, Perry in America and Biggs in Australia has led to descriptions of learning processes from the perspective of the student, in the real-life setting of classrooms, lectures and assessments. Fundamental qualitative differences in how students approach learning in normal educational settings have been discovered.

Much of this work was originally concerned with learning in higher education. Marton (Marton and Säljö, 1984) and Laurillard (1984), for example, described differences in how social science and science students tackle reading and problem-solving tasks. A surface approach involves minimalist engagement with the task, focusing on memorising or applying procedures unreflectively. In contrast, a deep approach involves an intention to understand and give meaning, and focuses on relations between parts of subject matter: the author's message in association with the evidence used to support it, or the structure of the problem as a whole. By definition a surface approach results in incomplete understanding. A deep approach is a necessary but not a sufficient condition for understanding.

Research in this area has led to the development of inventories of study processes that have identified general approaches used by students to series of tasks, or to courses of study in schools and universities (Entwistle and Ramsden, 1983; Biggs, 1987a, 1987b). The results of Biggs's Learning Process Questionnaire (LPQ) and the Lancaster Approaches to Studying Inventory (Ramsden and Entwistle, 1981) confirm beyond reasonable doubt the existence of generalized deep and surface study approaches (which have also been termed 'meaning orientation' and 'reproducing orientation', to distinguish them from the more specific approaches to particular tasks). A third approach of rather different character has also been identified. This achieving approach, or strategic orientation, describes the ways learners organize the educational context around them, rather than their engagement with learning tasks, and couples motivation to perform highly with 'good study habits'.

These three general approaches to studying can be combined in different ways. In particular, the achieving approach can be used in conjunction with either deep or surface approaches. Students who intend to obtain the highest possible grades, who organize their time and distribute their effort appropriately, and who study in an organized and consistent way, may either be focusing on understanding and relating ideas and evidence, or just trying to complete task requirements minimally.

These approaches have been found to be related to the outcomes of learning and to the educational context in which learning takes place (see Marton, Hounsell and Entwistle, 1984; Biggs, 1987a). Several investigations have shown that the achieving and deep approaches are associated with higher grades, while the surface approach is related to lower levels of performance. Deep approaches are also associated with more elaborate conceptions of learning such as the 'relativistic reasoning' described in Perry's scheme (Perry, 1970, and in press).

It is essential to grasp the contextual dependence of deep and surface approaches. They are relational phenomena, describing the quality of learners' engagement with learning tasks rather than individual characteristics. Relations between approaches and contexts have been demonstrated empirically at higher education level (Ramsden, 1984).

Students' perceptions of good teaching, clearly structured tasks, and a degree of choice in methods and topics of learning are related to meaningful approaches. Conversely, surface approaches in higher education are associated with perceived contexts that include high pressure to perform in assessments, excessive workload, and tasks that demand and reward continual rehearsal of well-understood procedures ('busywork'). These environments easily induce pragmatism and result in minimalist engagement with content -- a process that percipient commentators on education have been aware of for many years. Similar effects of teaching on the quality of student learning would seem to be likely at secondary level, especially when students are being prepared for tertiary study.

The recent research on learning in educational settings thus provides a theory which school effectiveness studies can use to model the process through which teaching may influence learning outcomes. The literature on student learning also offers an escape from the impasse created by excessive reliance on a single criterion of school effectiveness (external examination results). Deep approaches, being functionally related to higher quality learning outcomes, can be regarded as intervening variables between teaching methods and learning outcomes. However, they could also be considered as criteria: that is, as outcomes of schooling that may assist students to learn effectively at university level and are also valuable in themselves. This double-sided view of approaches to learning as both process and outcome is particularly important in view of the relation between the aims of teachers and the approaches. School 'effectiveness' implies a value judgement about the desirability of different educational outcomes and processes; deep approaches are complementary with the educational values of instructors at college and upper high school level.

In the present research we hypothesized that schools would differ at year 12 level in the teaching environments they provided and the approaches to learning that their students used. Entry into most higher education institutions in Victoria requires students to have gained high grades in the competitive external examination known as the Higher School Certificate, and we expected that variation in approaches might be restricted by this common examination. Differences deriving from students' previous educational and family experiences could also be presumed to play a part in the reported use of different approaches. However, we expected to discern school effects on students' approaches.

METHOD

Preliminary work

Preliminary work focused on developing a suitable instrument for characterising year 12 learning environments and on examining the relations between students' scores on Biggs's LPQ and their perceptions of teaching. A pilot inventory of students' perceptions (the School Experiences Questionnaire, [SEQ]) was completed by 172 students in four contrasting schools during late 1985. The SEQ took into account two traditions of research into students' perceptions of learning environments: the large body of knowledge on classroom environments (see Fraser, 1986), and studies of academic departments in higher education (see Ramsden, 1984).

Analysis of the pilot SEQ, using conventional item analysis procedures supported by a latent trait analysis (Wright and Masters, 1982), and guided by previous theory, confirmed the existence of five dimensions of students'

perceptions of this type of learning context. These are described below. Students also completed Biggs's LPQ at this stage of the research. The correlations between the LPQ and SEQ scales were in the directions predicted by the theory developed from studies of higher education students.

Instruments

The SEQ scales derived from the preliminary study, together with their Cronbach alpha internal consistency values, were as follows:

1. **Teaching support**. Measures the extent to which pupils think the teaching they experience is supportive of their learning. Sample item: Teachers in my classes make a real effort to understand difficulties students may be having with their work. (Alpha = 0.81)

2. **Emphasis on formal academic achievement**. Measures the extent to which pupils feel they are being encouraged to perform highly in external examinations. Sample item: There is great emphasis on academic achievement in these classes. (Alpha = 0.68)

3. **Independence in learning**. Measures the perceived stress in the curriculum on developing the capacity to learn independently. Sample item: We often discuss how we are going to learn things with our teachers. (Alpha = 0.64)

4. **Structure, climate and cohesiveness**. Measures the extent to which goals are clearly defined and pupils and staff share similar aims. Sample item: The teachers here make it clear right from the start what they require from students. (Alpha = 0.64).

5. **Preparation for study in higher education**. Measures the extent to which pupils feel they are being prepared for learning in higher education. Sample item: Students here have to take some responsibility for planning their own work. (Alpha = 0.58).

6. **School ethos**. A combination of scales 1, 3, and 4: an attempt to describe the 'epiphenomenon' (Cuttance, 1986) of school climate as defined by Rutter et al (1979). (Alpha = 0.86).

These scales may be regarded as measuring two aspects of a school learning context. First, they describe an individual student's experience of teaching; we would expect different students, with different previous experiences, to perceive the same teaching differently. Second, when scores on them are aggregated, they describe the teaching environment as a whole; differences in students' perceptions from this point of view are errors in the measurement of the true context of learning. The key point is that this second level of measurement is theoretically justifiable. The aggregated scores describe something that is more than the sum of the individual scores.

Biggs's LPQ is a published inventory, developed in Australia, that contains six scales (Biggs 1987a, 1987b). Each of three study motives has a corresponding strategy; these six sub-scales combined into three pairs form the approaches to learning (deep, surface and achieving) described above. Biggs has aggregated the motive-strategy combinations to higher levels in some studies, describing a 'deep-achieving' approach, for example (see Biggs, 1987a, for details; for a British evaluation of psychometric qualities of the higher education variant of Biggs's questionnaire, see O'Neill and Child,

1984). In this paper only analyses based on the sub-scales and the first order motive-strategy combinations are reported. Alphas given below refer to the present data.

The sub-scales are:

1. **Surface motive**. Measures the extent to which a student is motivated to meet institutional requirements minimally; studying is chiefly to gain qualifications and/or is characterized by fear of failure. Sample item: I chose my present subjects mainly because of career prospects when I leave school, not because I'm particularly interested in them. (Alpha = 0.49)

2. **Surface strategy**. Measures the extent to which students focus on memorising 'essentials'. Sample item: I find it better to learn just the facts and details about a topic rather than try to understand all about it. (Alpha = 0.60)

3. **Deep motive**. Measures the extent to which a student is interested in learning the content for its own sake. Sample item: I find that studying some topics can be really exciting. (Alpha = 0.60)

4. **Deep strategy**. Measures the extent to which a student tries to discover meaning by relating existing knowledge to new knowledge, reading widely, relating academic work to real life. Sample item: I try to relate what I have learned in one subject to what I already know in other subjects. (Alpha = 0.66)

5. **Achieving motive**. Measures the extent to which students strive to obtain the highest grades and 'play to win'. Sample item: I will work for top marks in a subject whether or not I like the subject. (Alpha = 0.66)

6. **Achieving strategy**. Measures study organisation. Sample item: I regularly take notes from suggested readings and put them with my class notes on a topic. (Alpha = 0.72)

Procedure

The population was year 12 students in schools in the metropolitan area of Melbourne. In Victoria, the majority of children attend comprehensive, mainly co-educational schools (the government sector). These schools are complemented by a parallel system of fee-paying schools. These private schools comprise two sub-groups: the catholic sector and non-catholic independent sector. The latter resemble British public schools, while the catholic group includes both small parish-related schools and large, high-status, academically-oriented schools that are virtually indistinguishable from the other independent schools.

During 1986 the revised SEQ and the LPQ were administered to a stratified random sample of 1490 year 12 students in 50 schools. An inventory of motivation and approaches to studying devised by Kozecki and Entwistle (Entwistle and Kozecki, 1985) was also administered. These results will be separately reported.

The sample was selected by a multi-stage procedure within sector, type of school by sex composition, and school (c.f. Goldstein, 1984). Schools were

sampled with a probability proportional to estimated size. Students within schools were either selected quasi-randomly by their teachers (particular care being taken by the research team to ensure that this process did not introduce bias due to volunteering, differences in arts-science specialities, or sex), or randomly from lists. This procedure produced usable returns from 745 government school students, 380 catholic students, and 365 independent students, with a mean number of students per school of 29.8 and a minimum of 17. The response rate was nearly 90 per cent.

In addition to data on students' perceptions and approaches, information on sex, age, ethnicity, and socio-economic status was collected. Students' Victorian Certificate of Education (HSC) results were later made available to the project by the examining body. A series of interviews took place in late 1986 of students in six schools. These interviews were intended to explore mechanisms connecting students' perceptions to their approaches to learning.

RESULTS

Approaches to learning and experiences of teaching in different sectors

The differences in approaches to studying among the three school sectors are quite small (Table 1). There are only five out of a possible eighteen statistically significant ($p < .01$) differences, even if no correction is made to the standard errors of the estimates to allow for the design effect of the two-stage sample. Independent school students score lower than both government and catholic students on surface motive, and lower than catholic students on surface strategy. Government students have higher scores than independent students on deep and achieving strategy, and higher scores than catholic students on achieving strategy.

Table 1: Approaches to learning by school sector (N=1490)

	Government		Catholic		Independent	
	Mean	SD	Mean	SD	Mean	SD
Surface motive	3.43*	.67	3.41*	.67	3.27*	.69
Surface strategy	2.62	.69	2.74*	.67	2.59*	.70
Deep motive	3.35	.70	3.35	.61	3.27	.68
Deep strategy	3.11*	.70	3.01	.63	2.99*	.66
Achieving motive	3.37	.74	3.32	.70	3.32	.76
Achieving strategy	3.16*	.77	3.00*	.73	3.02*	.76

* $p < .01$

It should not be inferred that these differences are caused by attendance at schools in different sectors. They are more likely to be due to selection effects. An index of socio-economic status (SES) was derived from students' responses to questions on parental occupation and education. SES and school sector are strongly related: while 39 per cent of the year 12 students whose fathers are professionals attended private non-catholic schools, only 8 per cent of the children of manual workers did. Correlations between standardized SES (with mean 0, standard deviation 1) and the approaches scales appear in Table 2 (the SES scale is keyed so that positive values indicate above average SES). The differences in motives and strategies between the sectors are partly attributable to SES variation. The children of manual workers, for example, are both more likely to attend government schools and to have higher surface approach scores. While deep and achieving approaches do not appear to be related to SES, it seems likely that unmeasured differences in the backgrounds of students in the different sectors may account for the small variations between sector means.

Table 2: Correlations between socio-economic status and approaches to learning (N=1420)

	Motives			Strategies		
	Deep	Surface	Achieving	Deep	Surface	Achieving
SES	-02	-12*	01	-04	-10*	-09*

* p <.01

Table 3 overleaf shows that there is a tendency for independent schools' students to perceive their schools to emphasize formal academic achievement more strongly than students in the other two sectors (p <.01). Independent schools are perceived to provide more teaching support than government schools (p <.01). The government schools are thought to provide a better preparation for higher education than either the catholic or independent schools (p <.01).

The differences between sectors do not, of course, imply that all schools or all students in a particular sector will show the characteristics of that sector. In this area of educational research we run a special risk of falling prey to the 'ecological fallacy' (Burstein, 1980) of attributing the characteristics of aggregates to the units that comprise them. The wisdom of this warning is well demonstrated in these data. The small between-sector differences in our sample conceal much larger between-school differences.

Table 3: Pupils' perceptions by school sector (N=1490)

	Government		Catholic		Independent	
	Mean	SD	Mean	SD	Mean	SD
Teaching support	3.65*	.72	3.74	.67	3.79*	.68
Structure & cohesiveness	3.74	.63	3.75	.59	3.80	.54
Independence in learning	3.34	.71	3.32	.67	3.38	.69
Preparation for h.e.	4.04*	.51	3.95*	.50	3.93*	.50
Emphasis on formal ach.	3.75*	.65	3.68*	.67	3.91*	.68
School ethos	10.74	1.76	10.80	1.66	10.96	1.58

* $p < .01$

Within-sector and between-sector differences

Table 4 shows the percentage of variance (eta^2) in several measures of approach and perception, and students' socio-economic status and HSC grades, that lies between sectors and schools.

Consider first the difference in the percentage of variation attributable to schools on the perceptions (SEQ) and the approaches (LPQ) scales. There is more between-school variation in the perceptions scales than the approaches scales. This is consistent with our intention that the SEQ scales should be regarded as more or less accurate measures of school environment. Approaches to learning should vary more between students: and, on the whole, they do.

Secondly, observe the relative heterogeneity of the catholic sector. Nearly forty per cent of the variation in SES is between-school variation, and about one quarter of the variation in HSC grades and perceptions of school ethos is attributable to differences between schools within this sector.

Thirdly, note that the between-sector variance is always smaller than the between-schools-within-sector variance. In the case of the SEQ and LPQ scales, the sizes of the differences between schools are large relative to those between sectors, indicating that the quality of school environments, and the quality of learning processes, are related to schools and students rather than sectors. This suggests that 'effective' schools -- in terms of the approaches to learning students typically use -- may be found in all three sectors. An example may help to put the differences between schools and sectors into perspective. The variation between independent and catholic schools on the surface motive scale amounts to less than a quarter of a standard deviation, while the difference between the highest and lowest school means is nearly 1.2 standard deviations.

Much more substantial variation exists between sectors on the examination performance and SES measures. However, there is even larger variation within the sectors. The schools are quite sharply segregated by SES at sixth form level, even within the government sector. Average examination performance also varies considerably within sectors: there are differences in how 'effective' schools are -- in terms now of the examination performance of their students -- within each sector. Subsequent reports will examine the relative effects of sector and school on performance in detail. The relation between approaches and examination results is considered later in this paper.

Effect of perceived school environment on approaches to learning

It was hypothesized that students' perceptions of the context in which they learned would be associated with their reported approaches to learning. The results of analyses of variance confirmed that there were large and significant differences between school means on all the SEQ measures (on the ethos scale, for example, $F = 6.34$, df 49,1401, $p < .0001$). As we have seen, the differences between school sectors were quite small in comparison. If our theory is correct, students' approaches should vary between schools as a result of the distinct environment each school offers.

Association between approaches and perceptions at individual level. We looked first at relations between approaches to learning and perceptions of the learning environment in the sample as a whole. It was expected that a

Table 4: Proportion of variation in school perceptions, approaches to learning, and selected outcome and background variables explained by sectors and schools

Variable	Percentage of variation attributable to: Sector	Schools within sectors Govt.	Cath.	Indep.
Teaching support	<1	16	21	10
Emphasis on formal academic achievement	2	13	18	15
Structure and cohesiveness	<1	14	19	9
Independence in learning	<1	11	19	13
Preparation for higher education	1	10	10	7
School ethos	<1	17	25	13
Surface motive	1	8	9	6
Surface strategy	<1	5	9	8
Deep motive	<1	8	8	10
Deep strategy	<1	7	5	7
Achieving motive	<1	5	11	5
Achieving strategy	1	6	5	12
Socio-economic status	16	27	39	28
HSC aggregate grade	11	18	23	20

Table 5: Correlations between approaches and perceptions (N=1475)

	Teaching support	Struct. and cohes-iveness	Prepn. for higher educ.	Independ. in learning	Emphasis on formal academic ach.	School ethos
Surface motive					26	
Surface strategy	-11	-06	-10		14	-08
Surface approach	-09				26	
Deep motive	25	24	24	26	09	29
Deep strategy	18	20	25	23	11	24
Deep approach	24	25	28	28	12	30
Achieving motive	10	17	14	15	25	17
Achieving strategy	24	29	29	28	10	31
Achieving approach	20	28	26	26	21	29

Decimal points omitted. Coefficients not significant at $p < .01$ are excluded.

deep approach to learning would be most strongly related to perceived encouragement of independence and a contextual orientation towards the demands of tertiary study. A surface approach ought to be most strongly associated with perceived pressure for academic success in year 12 examinations.

Correlations between approaches to learning and perceptions of the school environment are presented in Table 5. A pattern of positive associations is evident between the deep and achieving approach variables on the one hand and the SEQ variables describing a supportive learning climate (teaching support, structure and cohesiveness, preparation for higher education, independence in learning, school ethos) on the other. There are also significant correlations between emphasis on academic achievement and all the approach sub-scales, the strongest associations being with surface motive and achieving motive.

The general picture is more easily apprehended from the factor structure (following oblique rotation) shown in Table 6.

There is clear evidence for the hypothesized associations. Factor I connects the supportive learning context variables with deep approach and achieving strategy; Factor II links surface approach and achieving motive with school emphasis on formal achievement; Factor III brings together a deep-achieving approach and three of the supportive learning context scales.

Table 6: Factor analysis of SEQ and SPQ variables (N=1475)

	I	II	III
Teaching support	86		
Structure & cohesiveness	85		28
Independence in learning	77		28
Preparation for higher education	74		31
Surface motive		80	
Surface strategy		70	-25
Emphasis on formal achievement		59	
Deep strategy	26		79
Deep motive	31		76
Achieving strategy	35		76
Achieving motive		41	64
Per cent variance	31	16	13

Decimal points and loadings <.25 omitted.

Regression analysis to test the homogeneity of within-school slopes. Analysis at individual level of two sets of self-report data may be thought to produce a circular explanation. Students who adopt the approaches to learning favoured by their teachers might be expected to feel more positive about the teaching they experience. Which is cause and which is effect? We could conjecture that an analysis at aggregate (school) level would partly deal with this criticism. There are theoretical grounds for arguing that the SEQ scales measure the characteristics of school contexts, and that between-student variation within schools in the SEQ scores is 'noise'.

A problem of drawing valid inferences about individual approaches from aggregated data arises at this point. If the relation between perceptions and approaches is different in different schools we cannot validly argue that an analysis at aggregate level represents the effect of a school on a child's approach to learning. In this case it would be necessary to look elsewhere for the source of the variation between schools in their effects on students. Secondly, to assume that a school with (say) the highest mean deep approach score would be the school in which a particular student would be most likely to adopt a deep approach requires a further assumption that the effect of school context on approach to learning is constant within each school (Cuttance, 1985).

These assumptions were tested by performing a series of within-school and between-school regressions. We regressed the approach sub-scales on the perceptions scales in four different ways: at between-student (individual) level; at between-school (school mean) level; with pooled student residual scores (i.e. using their differences from the school mean as the dependent variable); and finally, using residual scores separately for each school (i.e. the unpooled difference scores). The test for parallelism involved calculating whether the increase in the explained sum of squares using the unpooled analysis was significant in relation to the residual sum of squares (see Keeves and Larkin, 1986, and Keeves and Sellin, in press, for an explanation of this technique). Similar analyses were conducted regressing each of the LPQ variables on each of the context variables; in no case did the unpooled analysis reveal a significant difference in slopes between schools.

Another series of analyses examined the possibility of heterogeneity in the slopes of the regression lines in different schools when the approaches were regressed on individual level SES. If the slopes varied, the assumption that the effect of a school context on students of different backgrounds was similar could not be sustained. No significant interactions were discovered. In the light of these findings we proceeded with analyses at school level.

Analysis at aggregate (school) level. Two sets of aggregate analyses will be reported here. The mean scores for school ethos (the higher-order scale combining teaching support, structure and cohesiveness, and independence in learning) were plotted against the school means for the six motives and strategies and the three approaches. The mean scores for emphasis on formal academic achievement were also plotted against the LPQ school means. The scatterplots were inspected for evidence of curvilinearity and outlying values. The correlation matrix is shown in Table 7.

Table 7: Correlations at school level between SEQ and LPQ variables (N=50)

	School ethos	School emphasis on formal academic achievement
Deep motive	35**	02
Deep strategy	25*	15
Deep approach	34**	09
Surface motive	-37**	26*
Surface strategy	-22	12
Surface approach	-33**	22
Achieving motive	07	38**
Achieving strategy	37**	02
Achieving approach	26*	22

Decimal points omitted.
** $p < .01$
* $p < .05$

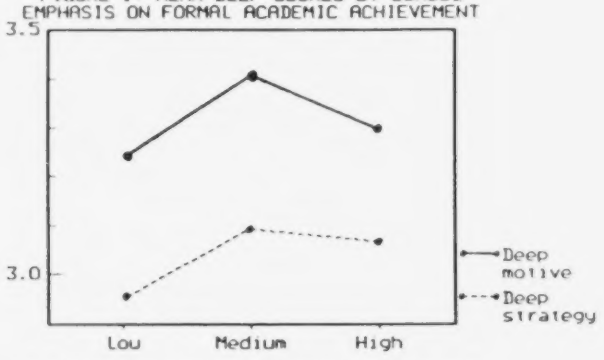
The relations between deep, surface and ethos are consistently in the predicted direction. Schools with a better perceived ethos are more likely to be populated by students who report the use of deep strategies and are motivated by intrinsic considerations. School ethos is negatively associated with surface approach. The main component of this negative association is surface motive; the coefficient for surface strategy just fails to reach statistical significance.

The achieving approach sub-scales relate to school ethos quite differently from each other, so much so that it seems meaningless to combine achieving motive and strategy in this part of the analysis. There is a strong positive correlation with achieving strategy and a near-zero correlation with achieving motive.

The relations between school emphasis on formal academic achievement and mean approaches to studying are more complex. The low correlation between deep approach and formal achievement emphasis derives from a non-linear association between these two variables. Figure 1, in which the 50 schools are divided into interquartile categories of low (12 schools), medium (26 schools), and high (12 schools) academic achievement emphasis, makes it clear what is happening. While either an excessive emphasis on formal achievement

or an avoidance of such emphasis may be detrimental to the development of deep approaches, it appears that a moderate emphasis on academic achievement is a favourable influence.

FIGURE 1 MEAN DEEP SCORES BY SCHOOL EMPHASIS ON FORMAL ACADEMIC ACHIEVEMENT



Surface motives and strategies, as expected, are positively associated with school emphasis on formal academic achievement. The achieving sub-scales again show differences from each other in their relations with school environment. This time, not surprisingly, it is the competitive and somewhat ruthless attitude ('I like the results of tests to be put up publicly so I can see by how much I beat some others in the class') represented by the achieving motive sub-scale that is evident in environments that definitely stress achievement. There is no association between study organisation (achieving strategy) and school emphasis on academic achievement.

Interview results. Students in schools with high mean scores on deep approach and surface approach were interviewed. The results provide evidence of the functional nature of the relation between students' perceptions and their learning processes. The interview results will be fully reported in subsequent papers; a preliminary account of the chief conclusions with supporting data has been provided in a research working paper available from the authors. Of particular interest is the tendency of students in schools with supportive teaching to describe a sense of control over and purpose in their learning, while students in less favourable environments evince a sense of helplessness, or alternatively cynicism, in the face of learning difficulties.

Approaches to learning and examination performance

What are the effects of approaches to learning on HSC grades? Figures 2 and 3 plot the aggregate examination grades of students against their approaches to learning, using the interquartile range of approach scores to define the low, medium, and high categories. Table 8 summarizes the significant differences in a one-way ANOVA on these scores. There is a modest negative association between surface approaches and examination performance ($r = -0.18$ for surface motive, and -0.25 for surface strategy). It would appear that reproductive and superficial approaches to learning are to some extent penalized in these examinations. This association is consistent with

previously described relations between surface approaches, complexity of learning outcomes, and lower levels of performance (Marton and Säljö, 1984; Watkins, 1983; Biggs, 1979, 1987a).

Table 8: Summary of significant differences in aggregate HSC score by approaches to learning (one way ANOVA) (N=1329)

	Surface ($p <$)	Deep ($p <$)	Achieving ($p <$)
Motive	.0001	(.05)	.0001
Strategy	.0001	n.s.	n.s.
Approach	.0001	n.s.	.0001

FIGURE 2: AGGREGATE HSC MARK BY APPROACHES TO LEARNING (Interquartile motive scores)

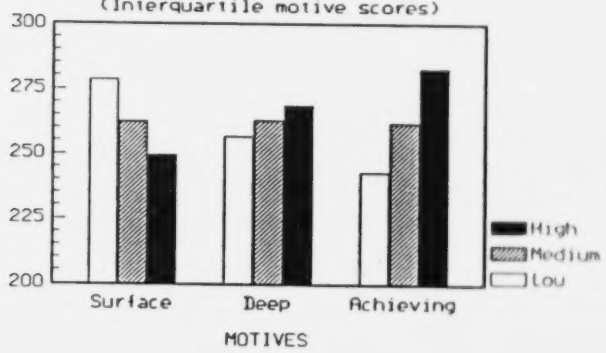
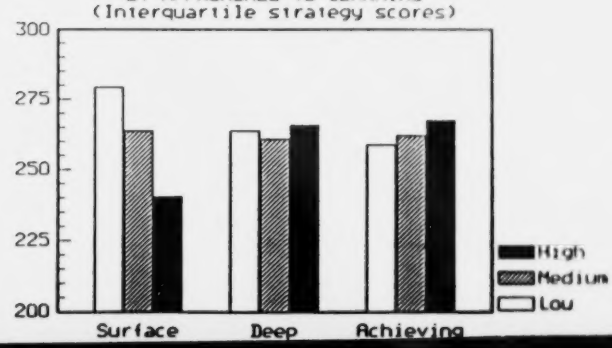


FIGURE 3: AGGREGATE HSC MARK BY APPROACHES TO LEARNING (Interquartile strategy scores)



The associations between deep and achieving approaches and performance depart somewhat from expectation. Deep approach is only marginally associated with aggregate grades (r = 0.05, with variation in deep motive providing the source of the association), contrary to earlier findings and to the theoretical link between complex outcomes and deep strategies. While achieving motive is predictive of high HSC grades (r = 0.24), achieving strategy is minimally related to performance (r = 0.06).

Unfortunately it was not possible in the present study to collect data on students' ability or previous achievement. The strongest predictor of performance among our variables was, as expected, socio-economic status. The correlation between standardized SES and aggregate HSC grade was found to be 0.39, a surprisingly high value considering that, of the 50 per cent of Victorian students who complete year 12, the children of higher status groups predominate.

A factor analysis with oblique rotation (Table 9) neatly captures the relations between approaches to learning, socio-economic status and examination results in this sample. Biggs's deep-achieving construct dominates the analysis (Factor I). Factor II is surface-achieving. Neither SES nor HSC aggregate grade have significant loadings on either Factor I or II, but instead define a third Factor which also includes the strategic, competitive element of the achieving approach.

Table 9: Factor analysis of approaches to learning, socio-economic status and aggregate HSC grade (N=1290)

	I	II	III
Deep motive	77		
Deep strategy	78		
Surface motive		84	
Surface strategy		75	
Achieving motive	60	45	36
Achieving strategy	77		
Socio-economic status			77
Aggregate HSC grade			85
Per cent variance	29	21	15

Decimal points and loadings <.30 omitted.

hope to demonstrate a connection between students' perceptions and the key factors of school effectiveness (such as purposeful leadership by the principal, intellectually challenging teaching and teacher involvement in curriculum planning) that have been identified in some previous studies (e.g. Mortimore et al, 1986).

The results of the analyses relating approaches to learning to examination performance suggest that a dominant influence on these students' learning is the powerful effect of competitive selection. A high aggregate score in the Victorian HSC is virtually a sine qua non for a place in one of the Victorian universities, particularly in the high demand courses such as medicine and law. The absence of an obvious relation between deep approach and examination performance in these data is therefore a matter of importance. Students who are strongly achievement motivated and who avoid surface approaches, even in school environments which encourage them, are more likely to gain the high grades they are looking for. But deep approach and achieving strategy are not consistently associated with higher levels of performance.

Biggs has maintained that a deep approach operates through intrinsic interest in the academic task. There is evidence that the relation between deep approaches and performance is strongest in preferred subjects (Biggs, 1987a, p.40). A recent investigation at the University of Melbourne discovered quite a strong association between deep approaches and first year student progress (Ramsden et al, 1986). The combined implications are disturbing. It seems probable that, as a direct result of the powerful pressure to obtain high aggregate grades, some students may be entering for HSC subjects in which they have developed little intrinsic interest. Certain combinations of HSC subjects are known to be ones where the chances of obtaining a really high aggregate grade are greatest. Some students taking these subjects may be negotiating their school-leaving examinations successfully without adopting the approaches to learning they will be expected to use subsequently in higher education. They may have avoided the worst excesses of a surface approach but they have stopped short before becoming immersed in what they are learning. It is likely that this process is more common in some schools than in others.

At several points in this paper we have emphasized the dangers of drawing conclusions about individual students or particular schools on the basis of aggregated data. To some extent, this caution holds true for the conclusions made about approaches to learning in different schools: we are not arguing that all students will respond to the teaching context in exactly the same way. However, the strength of the relation at different levels of analysis leaves little doubt about the effect of teaching on the probability of a student using a particular approach.

It is necessary finally to underline once more the large variation in approaches to learning and perceptions of teaching between schools compared with the differences between sectors in this sample. It is simply not true that the desirable approaches to learning are the prerogative of schools in any one sector. The message is simple: there are 'good' year 12 classes in all three sectors. If we allow that similar differences may exist in years other than the final one, the consequences for choice of school are important. Choice between schools ought to be made on the grounds of the quality of a particular school rather than the sector to which it belongs.

DISCUSSION AND CONCLUSIONS

Deep approaches exemplify the type of learning that employers and teachers expect students to demonstrate. It is only through using these approaches that students can gain mastery of concepts and a firm hold on detailed factual knowledge in a subject area. Combined with Biggs's achieving strategy (which consists of the habits of study organisation that have many times been related to academic success) a deep approach embodies the form of independent learning expected of students in higher education. It also implies the imaginative and adaptive skills and wide sphere of interests that are increasingly demanded in the world of work.

In contrast, surface approaches epitomize low quality learning, geared to short-term requirements and focused on the need faithfully to reproduce fragments of information presented in class or textbooks. They lead to poor long-term recall of detail and, even more seriously, to misunderstanding of fundamental concepts. The habitual use of surface approaches, or the avoidance of deep ones, may leave children with the idea that 'learning' belongs exclusively to an artificial realm of pleasing teachers and passing examinations. Instead of being a window through which the real world can be more clearly seen, learning becomes nothing more than the tedious recapitulation of other people's ideas, the substitution of numbers into formulae, or the retelling of facts (Marton and Entwistle, 1984).

The combined evidence of an association between approaches and school environments at individual level, of the existence of parallel slopes in the within-school regressions, and of a relation between school environment and approach at aggregate level, gives strong support to the contention that approaches to learning are influenced by students' perceptions of the year 12 environment. The differences between the schools are consistent across the three sectors.

In some ways the findings of the present study should come as no surprise. Two recent studies in Scotland (Selmes, 1985) and England (Martin, 1987), both using a quite different methodology from ours, provide evidence of the effects of different school and classroom contexts on approaches to learning at senior secondary level. Our results are also compatible with previous work on university students in a different educational system (Ramsden and Entwistle, 1981; Entwistle and Ramsden, 1983). The earlier research involved searching interviews with students as well as analysis of questionnaire data, and established that the relation between approaches and perceptions was functional and not merely an artefact of two sets of self-report data. A combination of aims that are perceived to be clearly defined, a degree of student choice over study methods, a firm (but not excessive) stress on academic goals, and the experience of supportive, well-structured teaching provides fertile conditions for high quality learning to take place. A very strong emphasis on examination performance induces, in some students at least, a tendency towards rote learning, a focus on the extrinsic rewards of studying, and remorseless competitiveness.

What is startling, perhaps, is that so much variation exists among schools. Despite the restrictions imposed by a common external examination, there is a real sense in which these schools differ in the quality of learning they evoke from their students. The extent of the variation raises the fundamental question of what organisational practices distinguish the schools that appear to offer more favourable contexts for learning. In order to answer this question, we are currently examining teachers' experiences and management policies in a second phase of the research in the 50 schools. We

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